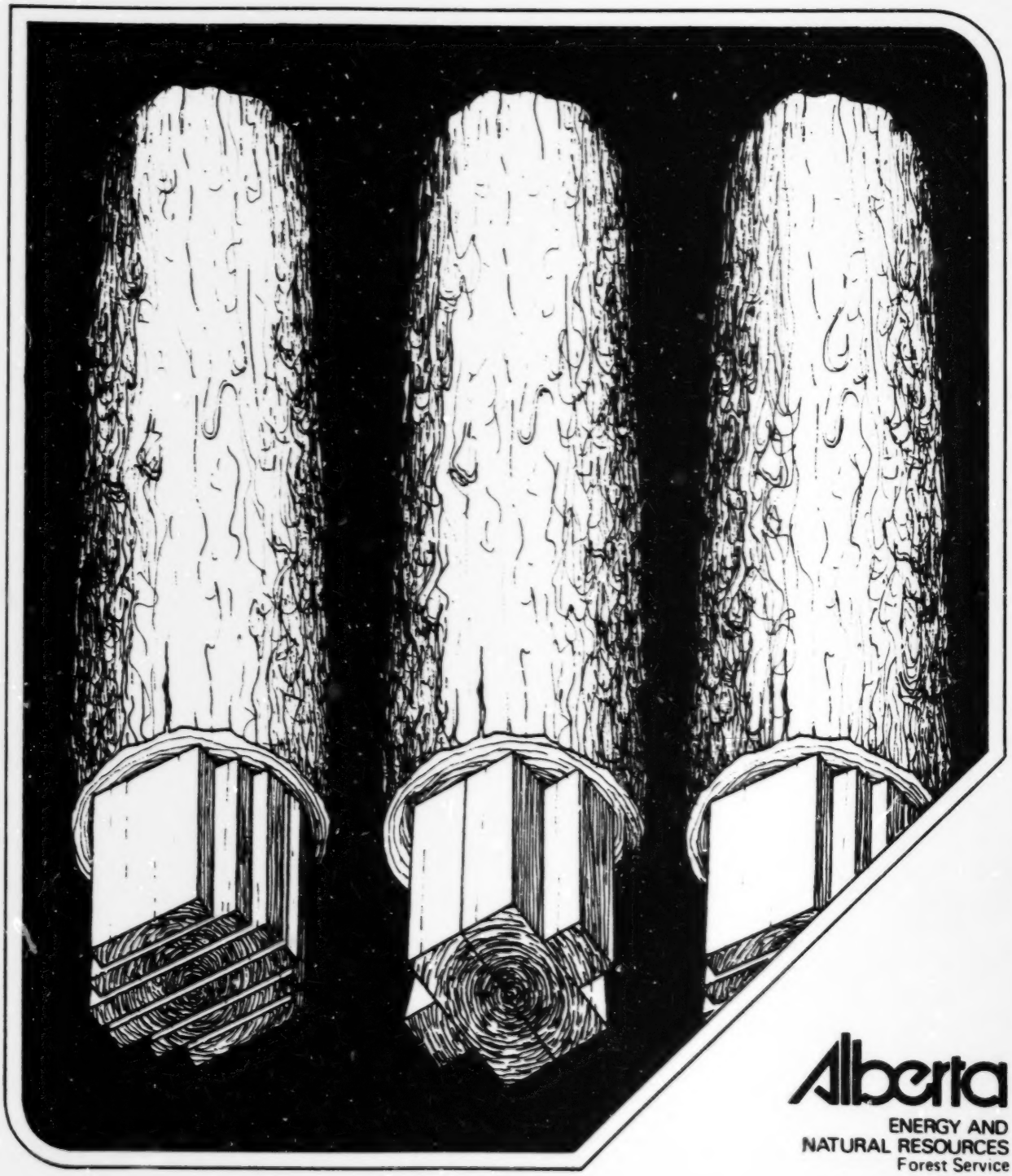
Guidelines for Sawmill Studies



Alberta
ENERGY AND
NATURAL RESOURCES
Forest Service

85-0528/

GUIDELINES FOR SAWMILL STUDIES

1984
Edmonton

ALBERTA ENERGY AND
NATURAL RESOURCES
FOREST SERVICE

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ADDITIONAL COPIES OF THE REPORT ARE AVAILABLE AT:

Alberta Energy and Natural Resources
Alberta Forest Service
Timber Management Branch
7th Floor, Bramalea Building
9920 - 108 Street
Edmonton, Alberta, Canada
T5K 2M4

OR

Alberta Energy and Natural Resources
Information Centre
Main Floor, Bramalea Building
9920 - 108 Street
Edmonton, Alberta, Canada
T5K 2M4

ABSTRACT

The objective of this procedure is to prescribe a uniform standard for establishing recovery factors from a cubic volume of logs entering the sawmill.

The procedures have been kept as simple as possible, so that if required, they can be readily done as a supplement to a mill inspection or as a basis for data collection. If more information (i.e. chip recovery) is required, the studies can be extended to cover this aspect also.

The same principle of input vs. output could apply to other manufacturing plants (i.e., plywood, posts) if desired.

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1. INTRODUCTION

This guideline covers the basic procedures for conducting a sawmill study. The variety of situations that develop in conducting studies may require that the procedures be altered slightly to fit the situation.

In keeping with the principle of relating the volumes of materials coming out of the sawmill to the logs entering the sawmill various measurements are necessary.

The volume of the logs entering the mill must be measured for the period the study is conducted. This volume is calculated as net m^3 of log scale.

A tally is made of the lumber leaving the sawmill. The lumber volume is calculated in foot board measure, m^3 of rough lumber (actual volume) and m^3 of planed lumber (actual volume). The lumber volumes are adjusted for loss at the planer in order to arrive at an estimate of salable lumber.

The recovery factors can then be calculated as being the amount of salable foot board measure (nominal measure) per m^3 of log volumes or as the percentage of dressed salable lumber (m^3 actual size) obtained from a m^3 of log volume.

The volume of rough lumber is used to determine the amount of loss from drying and surfacing and in calculating the sawdust volume.

The final planed lumber volume (m^3), the planer loss (shavings and drying) and the sawdust volume is deducted from the total net log scale to obtain an estimate of chip wood.

2. STUDY METHODS

2.1 Study Size

It is suggested that between 100 and 150 representative logs be selected for each study, depending upon the size of the mill. Special cases may occur when larger studies are desirable.

Mill management should be consulted before doing a study to arrange a convenient date and time.

2.2 Clearing Mill

Clear the sawmill of logs not being studied before starting and provide for a break at the end of the study to separate study logs and lumber from logs and lumber not being studied. Clearing is best done during coffee or meal break, or at the end of previous shift. If this is not possible, it will be necessary to mark non-study boards in the mill with lumber crayons. Mark all lumber lifts to distinguish non-study lumber from study lumber.

It may be necessary to add odd pieces of lumber removed by other than the normal green chain during the study, to the tally.

2.3 Scaling

Scale and run the study logs through the mill in a batch. The logs may be scaled on the rollway if safe. Otherwise, the logs may be pre-scaled as in the case of sample loads. The Alberta Cubic Metre volume is used as a base.

Scaling is carried out according to the Scaling Manual (Alberta Forest Service, 1979) except for the following:

2.3.1 Minimum Top

Logs will be scaled to the minimum top diameter of the disposition being manufactured. If calipers are used in measuring the top diameter, an additional one centimetre should be allowed for bark.

2.3.2 Log Lengths

Log lengths are recorded in usable standard lengths up to the minimum top of the disposition.

Example: 5.25 m log to be recorded to 4.8 m.

The above exception to the Scaling Manual is made because the purpose is to study the mill's efficiency. Mills cannot compensate for poor bucking, however this condition could influence the mill's efficiency rating. If poor bucking is a problem, the logs which are over length may be noted by an asterisk (*) during the study and considered separately.

2.3.3 Cull Deductions

The type of defect should be recorded as follows:

Heart Rot - 1	Crook - 5
Butt Rot - 2	Shake & Cracks - 6
Sap Rot - 3	Crotch - 7
Cat Face - 4	Mechanical Damage - 8

Mechanical damage is also recorded in the scale sheet as this data may be required to determine whether or not it influences the mill's lumber recovery factor. The volume of the mechanical damage, however should not be included in the deduction volume.

2.3.4 Calculate the Net Scale

(See Scale Sheet in Appendix A)

Example:	Gross scale (1X)	10.708 m^3
	Deductions (1X)	.706 m^3
	Net scale (1X)	10.002 m^3

2.3.5 Average Log Size

Calculate the average m^3 volume (gross) per merchantable length (metres) of log using scale data from the study.

Example:	Cubic volume m^3	10.708
	Merchantable length (m)	201.6

$m^3/m \quad \frac{10.708}{201.6} = 0.0531 \ (1000X) = 53$

2.4 Rough Lumber Tally

(a) Tally can be taken randomly on the green chain or on the lifts. It is imperative that study lumber not be confused with non-study lumber.

(b) Tally is taken by nominal size on all out run from study.

(c) Measurements should be taken and tallied on the lumber measurement sheet as specified in the Guideline for Manufacturing Inspection Reports (Alberta Forest Service, 1984 - Appendix 5).

On random length mills a sample of 100 pieces is preferred while on stud mills with only two or three products, 50 pieces are adequate.

As this data may be used for further calculations later, it should be collected and attached to the Sawmill Study Report.

2.5 Lumber Volume Compilation

2.5.1 Foot Board Measure

Compile volume for rough lumber outrun in terms of board feet for total study.

Reduce rough lumber output by an established planer falldown factor to determine the lumber output in terms of net fbm of dressed lumber. (Planer falldown factors are determined by studies as described in Section 4 Planer Falldown Factor.

The adjustment for planer loss may be done in two ways:

(1) Planer falldown as expressed as a percentage.

Example:		
	Rough lumber	2 584 fbm
	Planer falldown @ 4.6	119
	Net lumber salable	2 465

The above method is commonly used by mill personnel to express planer loss.

(2) Planer recovery factor expressed as a decimal.

Example:		
	Rough lumber	2 584 fbm
	Planer factor (multiplier)	.954
	Net lumber salable	2 465

The above method is usually employed in initial studies where there are planer factors for individual sizes.

2.5.2 Cubic Volume of Dressed Lumber

(The following section is optional but will be necessary if a lumber recovery factor by percentage is required.)

(a) See Table One for volumes. Metric equivalencies as defined by the Metric Handbook for Canadian Softwood Lumber (Metric Sub-Section Committee 8.21 - Softwood Lumber, Nov. 1977) are as follows for 2" X 4" X 16'.

Nominal		Dressed
2"	=	38 mm
4"	=	89 mm
16'	=	4.88 m

(b) The table is derived as follows: (2" X 4" X 16').

Actual volume per lineal foot (1000X) =

.038 X .089 X .305 = 1.0315 m^3

Volume for 16' piece (100X) = 1.0315 X 16 = 16.504 m^3.

Alternate calculation .038 X .089 X 4.88 X 1000 = 16.504 m^3.

(c) Compile the total m^3 volume of planed lumber by multiplying the number of pieces by the volume for each size by the m^3 per foot for that size. (See Appendix 1(F))

(d) Adjust volumes for planer falldown.

2.5.3 Cubic Volume of Rough Lumber

(The following section is optional because it is required only if an estimate of the (per cent) loss to shavings is desired.)

(a) A table of actual cubic volume is compiled using the average thickness and width from the sample of sizes taken on the rough lumber tally sheet. (See Appendix 4 for calculation of the rough lumber volumes.) Table volume should be calculated to four decimals for accuracy.

(b) Compile the total cubic volume for rough lumber by multiplying lineal feet for each size by the m^3/lineal foot.

2.6 Recovery Factor Calculation

2.6.1 Lumber Recovery Factor (LRF) - fbm of lumber per m^3 of roundwood.

Divide the Net fbm of planed lumber by the net m^3 scaled.

$$LRF = \frac{\text{Net salable planed lumber}}{\text{Net } m^3 \text{ scale}}$$

Example: Net salable lumber from a study - 2 465 fbm

Net m^3 scale (roundwood) - 10.002

$$LRF = \frac{2\ 465}{10.002} = 246 \text{ fbm}/m^3$$

The lumber recovery factor is compared with an adjusted m^3/m index to indicate if the recovery is reasonable. (See Appendix 5.)

An index will be compiled annually from studies done during the previous five years. This index shows the average recovery factors for that period depending upon the m^3/m, which indicates the size of log sawn.

2.6.2 Per cent of Roundwood Volume Produced as Lumber

Although the fbm/m^3 is the primary indicator of recovery at this time, it is desirable to find what portion of the log volume is recov-

ered as solid lumber. This lumber percentage, coupled with the percentage of shavings, sawdust and slab (chipable wood), are the basic breakdown of the log volume.

Through the years there has been an interest in the amount of by-products from logs. The percentage calculations show what and how much of the log volume can be recovered as various byproducts.

The average per cent of lumber recovery will be calculated parallel to the fbm/m^3 recovery and shown in Appendix 5 for comparison.

The per cent of solid lumber is calculated as follows:

Solid lumber volume (net 1000X) - 3 905

Net scale (1000X) - 20 002

$$\% \text{ lumber} = \frac{3905 \times 100}{10002} = 39.04\%$$

2.6.3 Per Cent of Roundwood Lost to Shavings and Shrinkage

(The following section is optional. However, it may be employed along with Section 2 if a breakdown of the various losses in a mill is desired.)

The shaving loss calculation is based on gross volumes as the lumber is usually planed and then trimmed. Planer falldown factors refer to trimming at the planer, and does not include fibre loss due to shavings.

$$\% \text{ loss} = \text{Gross } m^3 \text{ rough lumber} - \text{Gross } m^3 \text{ planed lumber}$$

$$\frac{\text{Gross } m^3 \text{ planed lumber} \times 100}{m^3 \text{ Scale}}$$

Example:

Net m^3 scale from study	10.002
Rough lumber gross volume	5.992
Planed lumber gross volume	4.093

$$\% \text{ loss} = \frac{5.992 - 4.093 \times 100}{10.002} = 1.75\%$$

3. PLANER FALLDOWN FACTOR

Planer falldown must be considered to determine a more realistic sawmill output. The falldown factor is determined by the ratio of the length of merchantable dressed lumber output over the length of gross lumber input.

3.1 Rough Lumber Input

A batch study is conducted by tallying individual lifts of lumber. As a rule, every second bundle is studied.

The first board on each lift is marked on the end before it goes to the planer. The person co-ordinating them follows this board past the planer and marks the face before the end is trimmed.

This identifies the first board for the people who tally the sizes and grades.

The first board of the next bundle is likewise followed through to identify the last board in the bundle. A tally of the total pieces by size is made for the lift.

All pieces are monitored by the co-ordinator while the lift is being run. Any pieces thrown out during the planing or trimming process are deducted so that the number of pieces counted before planing and the number of pieces tallied after planing can be compared.

3.2 Planed Lumber Output

Determine the number of lineal feet of planed lumber:

(a) Number 3/utility and better

(b) Economy only

- some sawmills convert a large percentage of economy lumber into chips which explains a lower lumber recovery factor.

(c) Economy lumber and better.

All planed pieces originating from the marked input lift are tallied and compared with the number of input pieces. If the number of pieces deviates by more than plus or minus two per cent, the batch study is rejected.

See Appendix 2 for an example of planer tally and planer factor calculations.

APPENDIX 1

EXAMPLE COMPILATION OF A SAWMILL STUDY

Log Scale Tally Sheet	1(a)
Summary of Scale Data	1(b)
Key to Examples on Scale Sheet	1(c)
AFS Lumber Tally Sheet	1(d)
Sawmill Study Lumber Compilation Sheet (fbm and Planed m^3)	1(e)
Sawmill Study Report	1(f)

APPENDIX 1(a)

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LOG SCALE TALLY SHEET

LESSEE, LICENSEE OR PERMITTEE	MILL	DISPOSITION CTP/CTL	F	MU	NO.	MILL NO.	LOAD NO.
AJAX SAW MILLS	ANY PLACE	S,A,W	M	1,1,-1	S,T	U,D,Y	—

DATE WEIGHED Y Y Y Y M M D D	POP	TOP	NET WT.	UNIT	TMB NO.	PRIMARY SP	PRIMARY CD	PRIMARY PR	PAGE 1 OF 2
1,9,8,0,1,1,2,1,0,6	—	—	—	—	—	S	G	0 1	

LOG NO.	GROSS SP	CD	PR	TOP DIA.	LGTH	VOL.	DEDUCTIONS SIZE	T	VOL.	BUTT DIA.	*
1				3.6	36	4.23	½(20½)	2	2.0		
2				2.6	36	2.2.1					
3				1.6	36	8.7					
4				3.6	4.8	5.9.0	12/48	1	7.4		
① 5				1.2	1.8	N.S.					
6				2.0	1.8	6.1					
7				2.6	4.2	2.6.3	2cm (225)	3	3.8		
8				2.2	4.8	* 2.2.3					
② 9				3.6	4.8	5.9.0	20%10/48	6	9.6		
0				2.0	4.8	1.8.6					
1				1.4	3.6	6.8					
2				1.4	1.8	3.1					
3				1.8	4.2	1.3.0					
4				2.2	4.8	2.2.3	10%	5	2.2		
5				3.0	4.8	4.0.9					
6				3.8	4.8	* 6.6.0	1/4	6	1.6.5		
7				1.4	2.4	4.2					
8				1.6	36	8.7					
9				2.0	4.8	1.8.6					
③ 0				2.6	4.8	3.0.8	25%	8	(7.7)		
SUB TOTAL # 1				75.6		4788	SUMMARIZE TOTALS ON REVERSE SIDE OF LAST PAGE		415		
SUB TOTAL # 1									(77)		

LOG NO.	GROSS SP	CD	PR	TOP DIA.	LGTH	VOL.	DEDUCTIONS SIZE	T	VOL.	BUTT DIA.	*
1				1.6	36	8.7					
2				2.0	4.8	1.8.6					
3				2.8	4.8	3.5.7	10%16/12	4	1.5		
4				2.8	4.8	3.5.7	5%	4	1.8		
5				1.4	2.4	4.2					
6				1.8	4.2	1.3.0					
7				2.4	4.8	2.6.4					
8				3.0	4.8	* 4.0.9	12/20/12	2	2.9		
9				1.4	1.8	3.1					
0				1.6	3.6	8.7					
1				2.0	4.2	1.5.9					
2				2.6	4.8	3.0.8					
3				1.8	3.6	1.0.8					
4				2.0	4.8	1.8.6	100%	1	1.8.6		
5				2.8	4.8	3.5.7					
6				1.6	3.0	7.0					
7				2.0	4.2	1.5.9					
8				2.4	4.2	2.2.5					
9				2.8	4.8	3.5.7					
0				1.4	3.6	6.8					
SUB TOTAL # 2				81.6		3947	TRIM ALLOWANCE 2.4-3.59 = 6cm 3.6-4.79 = 10cm 4.8+ = 15cm		248		
SUB TOTAL # 2											

* INCOMPLETE TREE FLAG. (9) T – Defect Type

ALBERTA CUBIC METRE SCALE – 1000x

Length	Top Diameter 4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62
1.2	2	4	7	10	15	20	26	32	40	48	57	67	77	89	101	114	128	143	158	176	192	210	229	249	269	291	313	337	361	386
2.4	5	9	15	23	32	42	55	68	84	101	120	140	162	186	212	239	269	300	333	367	404	442	483	525	570	618	664	715	767	822
3.0	7	12	20	30	41	55	70	88	106	129	153	179	206	238	271	306	344	384	426	471	518	568	620	676	732	792	855	920	989	1060
3.6	9	16	26	37	51	68	87	108	133	159	189	221	255	293	333	376	423	472	524	579	637	699	764	832	903	978	1056	1138	1223	1312
4.2	11	20	31	45	62	82	105	130	158	190	228	268	308	350	398	449	505	564	628	693	763	837	915	997	1083	1173	1268	1367	1470	1578
4.8	14	25	39	54	74	97	123	153	186	223	264	308	357	409	465	526	590	660	733	811	894	981	1073	1170	1272	1379	1491	1609	1732	1860

SPECIES		CONDITION		PRODUCT		CULL TYPE	
Spruce	– S	Green	– G	Sawlogs	– 01	Heart Rot	– 1
Pine	– P	Dead	– D	Pulpwood	– 02	Butt Rot	– 2
Balsam Fir	– F	Blowdown	– BK	Roundwood (B)	– 05	Sap Rot	– 3
Aspen	– A	Fire Killed	– BL	Fuelwood	– 06	Cat Face	– 4
Birch	– B	Insect Damage	– BN	Waterwood	– 18	Crook	– 5
Spruce / Pine	– SP	Beetle Killed	– BS			Shake & Cracks	– 6
		Endangered	– E			Crotch	– 7
		Industrial Salvage	– IS				
		Other Damage	– OD				

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LOG SCALE TALLY SHEET

LESSEE, LICENSEE OR PERMITTEE	MILL	DISPOSITION CTP/CTL F MU NO.	MILL NO.	LOAD NO.
AJAX SAWMILLS	ANY PLACE	S.A.W.M.I.L.L. S.T.U.D.Y.		—

DATE WEIGHED Y Y Y Y M M D D	POP	TOP	NET WT.	UNIT	TM 9 NO.	PRIMARY SP	PRIMARY CD	PRIMARY PR	PAGE
1.9.8.0.1.2.1.0.6	—	—	—	—	—	S	G	0 1	2 OF 2

LOG NO.	GROSS SP	GROSS CD	GROSS PR	GROSS TOP DIA.	GROSS LGTH	GROSS VOL.	DEDUCTIONS SIZE	DEDUCTIONS T	DEDUCTIONS VOL.	BUTT DIA.	*	LOG NO.	GROSS SP	GROSS CD	GROSS PR	GROSS TOP DIA.	GROSS LGTH	GROSS VOL.	DEDUCTIONS SIZE	DEDUCTIONS T	DEDUCTIONS VOL.	BUTT DIA.	*
1				1.6	3.6	.8.7						1											
2				1.8	4.8	.1.5.3						2											
3				2.4	4.8	.2.6.4						3											
4				2.8	4.8	.3.5.7	10%	1	4.3			4											
5				2.0	3.6	.1.3.3						5											
6				2.0	4.8	.1.8.6						6											
7				2.6	4.8	*3.0.8						7											
8				1.4	3.6	.6.8						8											
9				1.8	4.8	.1.5.3						9											
0				2.4	4.8	2.6.4						0											
1												1											
2												2											
3												3											
4												4											
5												5											
6												6											
7												7											
8												8											
9												9											
0												0											
SUB TOTAL # 1				44.4		1973	SUMMARIZE TOTALS ON REVERSE SIDE OF LAST PAGE		43			SUB TOTAL # 2							TRIM ALLOWANCE				
SUB TOTAL # 1												SUB TOTAL # 2							2.4-3.59= 8cm 3.6-4.79=10cm 4.8+ =15cm				

* INCOMPLETE TREE FLAG. (9) T – Defect Type

* 4 LOGS ARE OVER LENGTH

ALBERTA CUBIC METRE SCALE – 1000s

Length \ Top Diameter	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62
1.2	2	4	7	10	15	20	26	33	40	48	57	67	77	89	101	114	128	143	158	175	192	210	229	249	269	291	313	337	361	386
2.4	5	9	15	23	32	42	55	68	84	101	120	140	162	186	212	239	269	300	333	367	404	442	483	525	570	618	664	715	767	822
3.0	7	12	20	30	41	55	70	88	108	129	153	179	208	238	271	306	344	384	426	471	518	568	620	675	732	792	855	920	989	1060
3.6	9	16	26	37	51	68	87	108	133	159	189	221	258	293	333	376	423	472	524	579	637	699	764	832	903	978	1056	1138	1223	1312
4.2	11	20	31	45	62	82	105	130	159	190	226	263	306	350	398	449	505	564	626	692	763	837	918	997	1083	1173	1268	1367	1470	1578
4.8	14	25	38	54	74	97	123	153	186	223	264	309	357	409	465	526	590	660	733	811	894	981	1073	1170	1272	1379	1491	1609	1732	1860

SPECIES		CONDITION		PRODUCT		CULL TYPE	
Spruce	– S	Green	– G	Sawlogs	– 01	Heart Rot	– 1
Pine	– P	Dead	– D	Pulpwood	– 02	Butt Rot	– 2
Balsam Fir	– F	Blowdown	– BD	Roundwood (B)	– 05	Sap Rot	– 3
Aspen	– A	Fire Killed	– ID	Fuelwood	– 06	Cat Face	– 4
Birch	– B	Insect Damage	– IK	Waferwood	– 18	Crook	– 5
Spruce / Pine	– SP	Beetle Killed	– BK			Shake & Cracks	– 6
		Endangered	– EN			Crotch	– 7
		Industrial Salvage	– IS				
		Other Damage	– OD				

APPENDIX 1(b)

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LOG SCALE TALLY SHEET

LESSEE, LICENSEE, PERMITTEE	DISPOSITION CTP/CTL	F	MU	NO.	POP.	TOP
AJAX SAWMILLS	SAWMILL	S	T	U.D.V	—	—

DATE WEIGHED Y Y Y Y M M D D	TM 9 NO.	LOAD NO.	NET WEIGHT	UNIT
1.9.8.0.1.2.0.6	—	—	—	—

PAGE	COL.	LOGS	LENGTH	SP: 5 CD: G PR: 0 1 GROSS SCALE	DEDUCTIONS	SP: CD: PR: GROSS SCALE	DEDUCTIONS	SP: CD: PR: GROSS SCALE	DEDUCTIONS
1	1	19	75.6	4788	415				
	2	20	81.6	3947	248				
2	1	10	44.4	1973	43				
	2								
3	1								
	2								
4	1								
	2								
5	1								
	2								
6	1								
	2								
7	1								
	2								
8	1								
	2								
9	1								
	2								
10	1								
	2								
TOTALS		49	201.6	10708	706				
1 x SCALE – 3 Decimals Divide totals by 1000				10.708	.706				
NET SCALE Gross Scale Minus Deductions				10.002					

SCALER:	CHECK SCALER:	AUDIT CHECK BY:

TREES ONLY	Received by	Date	Checked by	Date	Entered by	Date

APPENDIX 1(c)

KEY TO EXAMPLES ON SCALE SHEET

(1) Logs are scaled to the minimum top diameter specified for the dispositions being sawn. Minimum length scaled will be 1.2 m. In fixed length mills (i.e. stud mills) these short logs are unavoidable. In multiple length mills circumstances such as this may be attributable to poor bucking practices.

Measure the minimum to diameter on top logs with calipers (allowing for bark) and record these logs by .6 m intervals.

It is important to measure the lengths of these small logs with care. Their merchantable volume is negligible but they bear equal weight to large logs in so far as their merchantable length of log is a major factor used in determining a mill's efficiency.

(2) Overtrimmed logs are identified on the Scale Sheet by an asterisk (*) but, only the length that is available to lumber manufacture is recorded.
Example - 5.12 m log is recorded as 4.8 m log.

Mills cannot compensate for poor bucking practices thus it should not influence their efficiency rating.

In this particular case four logs out of a total of 50 (eight per cent of the logs) are overtrimmed and in accordance with Section 2 under YARD HANDLING in Guide-Lines for Mill Inspections constitutes an unsatisfactory situation which requires corrective action.

(3) Mechanical damage is not a recognized cull in any scale system used in Alberta. Dimensions should, however, be entered on the scale sheet in the event that the lumber recovery factor is below standard and a calculation is required to determine if this is a contributing factor.

If the amount of mechanical damage is unacceptable, corrective action should be initiated.

(4) When a log is in excess of 2/3 cull, it is counted as 100 per cent cull. If this occurs too frequently on a mill efficiency study, the study may have to be rejected. This situation can have tremendous influence on the lumber recovery factor in this particular type of study.

(5) Total length includes the merchantable length of all logs to the minimum size specified for the disposition being sawn. Small non-scale logs and cull logs are not included in the total.

APPENDIX 1(d)

FORM No. TM 99

A. F. S. LUMBER TALLY SHEET

File No. _____

Date 80-02-20 19 _____ T. L. or C. T. P. No. _____ Page No. 1 of 1

Lessee, Licensee, Permittee Mill Efficiency Study

Contractor AJAX SAWMILLS Camp No. _____

Thickness Width	Length in Feet									
	6	8	10	12	14	16	18	20		
1" x 4"		⚅ ③	⚄ ⑥	⚃ ⑦	⚄ ⑥	⚂ ⑧				
1" x 6"		⚀ ①	⚅ ③	⚀ ①	⚀ ①	⚅ ②				
1" x 8"		⚀ ①								
1" x 10"										
Thickness Width	6	8	10	12	14	16	18	20		
2" x 4"		⚄ ⑥	⚃ ⑰	⚃ ⑭	⚃ ⑱	⚃ ㉕				
2" x 6"		⚅ ③	⚃ ⑨	⚃ ⑩	⚃ ⑩	⚃ ㊸				
2" x 8"		⚅ ②	⚀ ①	⚅ ③	⚅ ④	⚃ ⑮				
2" x 10"		⚀ ①	⚀ ①	⚅ ②	⚀ ①	⚅ ⑤				
2" x 12"										

'Sample Measurement Taken of Actual Thickness Are as Follows'

APPENDIX 1(e)
SAWMILL STUDY LUMBER COMPILATION SHEET

Study: AJAX SAWMILLS Date of Study: 80/12/06 Compiler: John Woodhead Page: 1 of 2

Measurement: ☑ FBM ☐ Rough Cubic ☐ Planed Cubic							☐ FBM ☐ Rough Cubic ☑ Planed Cubic				
Nominal Size	Pieces	Lineal Feet	Vol/pc or Vol/ft ✓	Gross Volume	Planer Factor	Net Volume	Lineal Feet	Vol/pc or Vol/ft ✓	Gross Volume	Planer Factor	Net Volume
1X4X8	3	24									
X10	6	60									
X12	7	84									
X14	6	84									
X16	8	128									
Subtotal	30	380	0.3333	127	0.865	110	380	0.4614	175		
1X6X8	1	8									
X10	3	30									
X12	1	12									
X14	1	14									
X16	2	32									
Subtotal	8	96	0.5000	48	0.880	42	96	0.7259	70		
1X8X8	1	8									
Subtotal	1	8	0.6667	5	0.892	4	8	0.9540	8		
2X4X8	6	48									
X10	17	170									
X12	14	168									
X14	18	252									
X16	25	400									
Subtotal	80	1038	0.6667	692	0.966	668	1038	1.0315	1071		
2X6X8	3	24									
X10	9	90									
X12	10	120									
X14	10	140									
X16	43	688									
Subtotal	75	1062	1.000	1062	0.941	999	1062	1.6226	1723		

APPENDIX 1 (e) continued

SAWMILL STUDY LUMBER COMPILATION SHEET

Study AJAX SAWMILLS Date of Study 80/12/06 Compiler John Woodhead

Measurement: ☑ FBM ☐ Rough Cubic ☐ Planed Cubic							☐ FBM ☐ Rough Cubic ☑ Planed Cubic				
Nominal Size	Pieces	Lineal Feet	Vol/pc or Vol/ft ✓	Gross Volume	Planer Factor	Net Volume	Lineal Feet	Vol/pc or Vol/ft ✓	Gross Volume	Planer Factor	Net Volume
2X8X8	2	16									
X10	1	10									
X12	3	36									
X14	4	56									
X16	15	240									
Subtotal	25	358	1.3333	477	0.989	472	358	2.1325	763		
2X10X8	1	8									
X10	1	10									
X12	2	24									
X14	1	14									
X16	3	48									
Subtotal	8	104	1.6667	173	0.987	171	104	2.7236	283		
TOTAL	227	3046		2584		2466			4093	0.954	3901
		Ave.	Factor =	2466 / 2584 =	0.954						

APPENDIX 1(f)

Alberta
ENERGY AND NATURAL RESOURCES

SAWMILL STUDY REPORT

MILL: Ajax Sawmills	STUDY NO. 1	DATE: 80/12/06
MILL LOCATION:	RANGER DISTRICT	FILE NO.

1. SCALE DATA (m^3)

Gross Scale (1000X)	10 708		
Deductions (1000X)	706	Deduction%	6.6
Net Scale (1000X)	10 002	No. of Merch. Logs	49
Net Scale (1X)	10 002	Merchantable Length	201.6
		Gross m^3/m (1000X) (whole number)	53

2. LUMBER DATA (fbm)

Lumber from Sawmill	2 584	fbm% 1"	7.0 % 2" + 93.0
Planer Factor	0.954	% Falldown	4.6
Net Lumber Saleable	2 465		
Lumber Recovery (fbm/m^3) (0 dec.)		Mill Recovery 246	Average Recovery 222

3. LUMBER DATA (m^3 Planed)

Lumber from Sawmill (1000X)	4 093	Headsaw Kerf	5/16"
Planer Factor (1000X)	0.954	Gang Saw Kerf	3/16"
Net Lumber Saleable (1000X)	3 905	Resaw Kerf	(chipper)
% Recovered as Lumber (2 dec.)		Mill Recovery 39.04	Average Recovery 34.38

4. LUMBER DATA (m^3 Rough)

Rough Lumber Gross Volume (1000X)	5 922	NOTE: This calculation is optional and only required if shaving loss is desired.
Planed Lumber Gross Volume (1000X)	4 093	
Loss to Shrinkage & Shavings	1 829	Net Scale m^3 (1000X) 10,002
		%Loss (2 dec.) 18.29

SIGNATURE

APPENDIX 2

EXAMPLE OF PLANER STUDIES

Planer Study Tally Sheet	2(a)
Planer Study Compilation Sheet	2(b)
Planer Study Summary Sheet	2(c)

APPENDIX 2 (a)

Planer Study Tally Sheet

Lumber Grades

Light Framing	Structural Joints and Planks	Stud Rule	Board Rule
* (1) Construction	* (1) Select Structural	(1) Studs	* (1) D select
* (2) Standard	* (2) No. 1	(2) Economy	* (2) No. 2 Common
* (3) Utility	* (3) No. 2	(3) Cull	* (3) No. 3 Common
(4) Economy	* (4) No. 3		* (4) No. 4 Common
(5) Cull	(5) Economy		(5) No. 5
	(6) Cull		(6) Cull

* Group the upper grades together for study purposes. These grades are generally grouped together and sold as one. (i.e. light framing material may be sorted and sold as utility and better.)

In many cases the economy grade (or #5 Board) and cull are run off the chain together. The combination may be referred to as cull lumber or economy lumber. In these instances it will be necessary to determine the actual cull pieces and tally them separately.

Generally excessive wane and skip will create a cull board. In light framing and stud grades wane and skip are allowed up to 1/4 inch on economy pieces. In structural economy wane is allowed up to 2/3 the thickness or width for a short length (2') and up to 1/8 skip is allowed. In board grades, No. 5 allows 1/8 scant or 1/2" narrow.

PLANER STUDY TALLY SHEET

Planer Mill: AJAX SAWMILLS | Dimensions: 2 x 4 | Date: August 10th 1980 | Tally Man: John Woodhead

Study No 1 — Input / Output ✓

Length	Grade	Tally	Pcs
8	#3 +	⁻ .	5
10	#3 +	⊠⊠⊠⊠	40
12	#3 +	⊠⊠⊠⊠ ⊠⊠	117
14	#3 +		

Comments: Tally of #3 and better only. Economy tallied on another sheet. Total: 162

Study No 2 — Input / Output ✓

Length	Grade	Tally	Pcs
6	Ec		
7	Ec	: :	5
8	Ec	⊠⊠ : :	24/29
Retrim			
7-6	Stud	: '	3
8-7	Stud	⊠ : '	13/16

Note: This illustration shows the output tally of one person. When comparing this tally to the compiliation sheet it must be remembered that the tally of the second person has not been shown.

Comments: Tally of economy and retrim only. Stud grade tallied on another sheet. Total: 45

Study No ____ — Input / Output

Length	Grade	Tally	Pcs

Comments: Total:

APPENDIX 2(b)

PLANER STUDY COMPILATION SHEET

Planer Mill: AJAX SAWMILLS | Date: July 21/82 | Dimensions: 2 x 4 | Study No: 1

Length	Input		Output						Comments
	Pieces	Lineal Feet	#3 Utility #4 Board or Better		Economy or #5 Board		Cull		
			Pieces	Lineal Feet	Pieces	Lineal Feet	Pieces	Lineal Feet	
8			5	40					* 2 pieces added to input Tally to balance.
10			40	400					
12	162	1944	117	1404	2	24			
14									
16									
18									
*12	+2	24							
									Total Pieces Out
Total Pieces	164	(A)	162	(B)	2	(C)		(D)	164
Total Lineal Feet		1968		1844		24			
Lineal Feet Out (B+C)			Planer Factor (B+C) divided by A (3 dec)		.949	% Economy or #5 Boards (C x 100) divided by (B+C) 2 dec.			1.28%

Planer Mill: AJAX SAWMILLS | Date: July 21/82 | Dimensions: 2 x 4 | Study No: 2

Length	Input		Output						Comments
	Pieces	Lineal Feet	#3 Utility #4 Board or Better		Economy or #5 Board		Cull		
			Pieces	Lineal Feet	Pieces	Lineal Feet	Pieces	Lineal Feet	
* ~~8~~	-3	-24							* Deleted 3 pieces from input to balance
~~10~~									
7 to 6 ~~12~~	**		3	18					** Pieces set aside for retrim were treated as 1' Shorter.
8 to 7 ~~14~~	**		13	91					
~~16~~									
~~18~~									
6	10	60	17	102					
7	19	133	15	105	5	35			
8	219	1752	168	1344	24	192			
									Total Pieces Out
Total Pieces	245	(A)		(B)	29	(C)		(D)	245
Total Lineal Feet		1921		1660		227			
Lineal Feet Out (B+C)		1887	Planer Factor (B+C) divided by A (3 dec)		.982	% Economy or #5 Boards (C x 100) divided by (B+C) 2 dec.			12.04

PLANER STUDY COMPILATION SHEET

Planer Mill: AJAX SAWMILLS | Date: July 24/82 | Dimensions: 2x6 resawn to 1x6 | Study No: 3

Length	Input: Pieces	Input: Lineal Feet	Output: #3 Utility #4 Board or Better: Pieces	Output: #3 Utility #4 Board or Better: Lineal Feet	Output: Economy or #5 Board: Pieces	Output: Economy or #5 Board: Lineal Feet	Output: Cull: Pieces	Output: Cull: Lineal Feet	Comments
8			8						Study Deleted -piece difference too great.
10			9						
12	105		177	3		1			
14									
16									
18									
1x6 equiv	X2								Total Pieces Out
Total Pieces	210	(A)	194	(B)		(C)		(D)	198
Total Lineal Feet				3		1			
Lineal Feet Out (B+C)			Planer Factor (B+C) divided by A (3 dec.)				% Economy or #5 Boards (C x 100) divided by (B+C) 2 dec.		

Planer Mill: AJAX SAWMILLS | Date: July 24/82 | Dimensions: 2x6 resawn to 1x6 | Study No: 4

Length	Input: Pieces	Input: Lineal Feet	Output: #3 Utility #4 Board or Better: Pieces	Output: #3 Utility #4 Board or Better: Lineal Feet	Output: Economy or #5 Board: Pieces	Output: Economy or #5 Board: Lineal Feet	Output: Cull: Pieces	Output: Cull: Lineal Feet	Comments
8			1	8					* 3 pieces added to 2x6 input to balance.
10			4	40					
12			58	696					
14	105	1470	141	1974	9	126	3	42	
16									
18									
14*	+3	42							
1x6	X2								Total Pieces Out
Total Pieces	216	(A)	204	(B)		(C)	3	(D)	216
Total Lineal Feet		3024		2718		126			
Lineal Feet Out (B+C)		2844	Planer Factor (B+C) divided by A (3 dec.)		.940		% Economy or #5 Boards (C x 100) divided by (B+C) 2 dec.		4.43

APPENDIX 2(c)

Summary of Planer Studies

Company: AJAX SAWMILLS						Planer Mill					
Dimensions: 2 x 4						Dimensions: 2 x 6					
Study No.	Input Lineal Feet	Output Lineal Feet	Planer Factor	Economy Lineal Feet	%Economy	Study No.	Input Lineal Feet	Output Lineal Feet	Planer Factor	Economy Lineal Feet	%Economy
1	1968	1868	.949	24	1.28	1	3024	2844	.941	126	4.43
2	1921	1887	.982	227	12.04						
Total	3889	3755	.966	251	6.68	1	3024	2844	.941	126	4.43

APPENDIX 3

EXAMPLE OF ROUGH LUMBER VOLUME COMPILATION

Volume Table Calculations	3(a)
Gross Rough Lumber Calculations	3(b)

APPENDIX 3(a)

Volume Table Calculations

Section 1

Deviation From Nominal (1/16")	MEASUREMENTS FOR UNIFORM SIZE – NOMINAL SIZE – ROUGH LUMBER											
	Thickness of Measurements					Width of Measurements						
	1	2	3	4		4	6	8	10	12		
-6												
-5		2						1				
-4		2						1				
-3		3				1	2	2				
-2		4				3	2	1	2			
-1	2	5				3	2	2	2			
Nominal (0)	3	5				3	4	2	2			
1	3	4				4	3	2	2			
2	3	3				2	2	1	1			
3	4						1		1			
4	2											
5												
6												
7												
8												
Total Measures	28	56			=84	28	28	14	14			
Average *	1.098	1.943				3.987	5.978	7.946	9.987			

Tolerance limits indicated by heavy line

* Required Only On Mill Studies

(1) Example of calculating average size and volume for Rough Lumber (Dimensions in Imperial – volume in m^3)

2"

Pcs	X	Deviation	=	total
3	X	(-5)	=	-15
2	X	(-4)	=	- 8
6	X	(-3)	=	-18
8	X	(-2)	=	-16
13	X	(-1)	=	-13
11	X	(0)	=	0
7	X	(+1)	=	+ 7
6	X	(+2)	=	+12
56				-51

Ave. 1/16 = $\frac{-51}{56}$ = -0.911

Ave. dev. (inches) = $\frac{-0.911}{16}$ = -0.057

Total inches = 2 – 0.057 = 1.943

Size (mm) = 25.4 X 1.943 = 49 mm

4"

Pcs	X	Deviation	=	total
1	X	(-3)	=	- 3
5	X	(-2)	=	-10
6	X	(-1)	=	- 6
6	X	(0)	=	0
7	X	(+1)	=	7
3	X	(+2)	=	6
28				- 6

Ave. 1/16 = $\frac{-6}{28}$ = -0.214

Ave. dev. (inches) = $\frac{-0.214}{16}$ = -0.013

Total inches = 4 – 0.013 = 3.987

Size (mm) = 25.4 X 3.987 = 101 mm

(2) Example of Volume Compilation. Rough Lumber m^3 volume (1000X) per lineal foot (.305)

Size – 2 X 4 m^3 (1000X) = .049 X .101 X 1000 X .305 = 1.5094 m^3/ft.

(3) Example of a volume table (m^3/ft. for Rough Sizes)

1 X 4 (28 mm X 101 mm) = 0.8625	2 X 4 (49 mm X 101 mm) = 1.5094
1 X 6 (28 mm X 152 mm) = 1.2981	2 X 6 (49 mm X 152 mm) = 2.2716
1 X 8 (28 mm X 202 mm) = 1.7251	2 X 8 (49 mm X 202 mm) = 3.0189
1 X 10 (28 mm X 254 mm) = 2.1692	2 X 10 (49 mm X 254 mm) = 3.7960

APPENDIX 3 (b)

Gross Rough Lumber Calculations

SAWMILL STUDY LUMBER COMPILATION SHEET

Study AJAX SAWMILLS Date of Study 80/12/06 Compiler John Woodhead

Page _____

Measurement ☐ FBM ☐ Rough Cubic ☐ Planed Cubic							☐ FBM ☐ Rough Cubic ☐ Planed Cubic				
Nominal Size	Pieces	Lineal Feet	Vol/pc or Vol/ft	Gross Volume	Planer Factor	Net Volume	Lineal Feet	Vol/pc or Vol/ft	Gross Volume	Planer Factor	Net Volume
1x4	30	380	0.8625	328							
1x6	8	96	1.2981	125							
1x8	1	8	1.7251	14							
			Subtotal	467							
2x4	80	1038	1.5094	1567							
2x6	75	1062	2.2716	2412							
2x8	25	358	3.0189	1081							
2x10	8	104	3.7960	395							
			Subtotal	5455							
			TOTAL	5922							

APPENDIX 4

CALCULATION OF SAWDUST VOLUMES FROM MILL STUDIES

With the additional information on Saw Kerf size included, an estimate of sawdust can also be calculated on detailed mill studies when rough lumber measurements have been taken.

The principle behind the calculations is that the log will be broken down in two or more steps. Firstly, by use of a scragg saw or chipper, the end result being a cant:

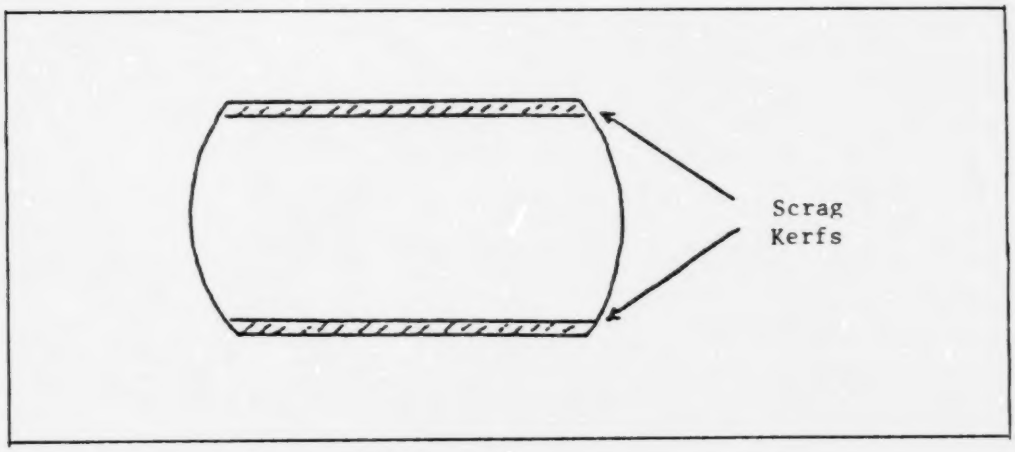

FIGURE 1. Edge cuts used for the calculation of sawdust volumes.

and secondly, by use of a Gang saw:

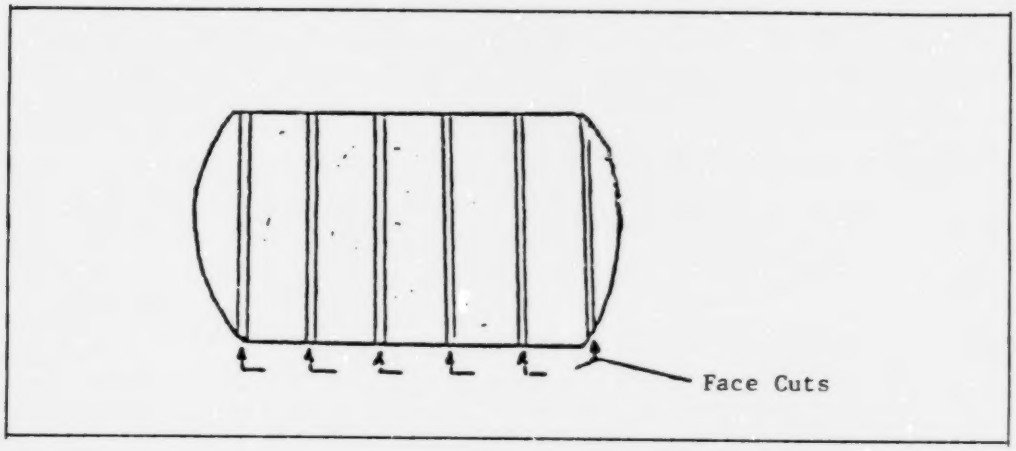

FIGURE 2: Face cuts used for calculation of sawdust volumes.

The calculations are made for each thickness class: 1", 2", etc.

Edge cuts are calculated for each size using the factors illustrated below:

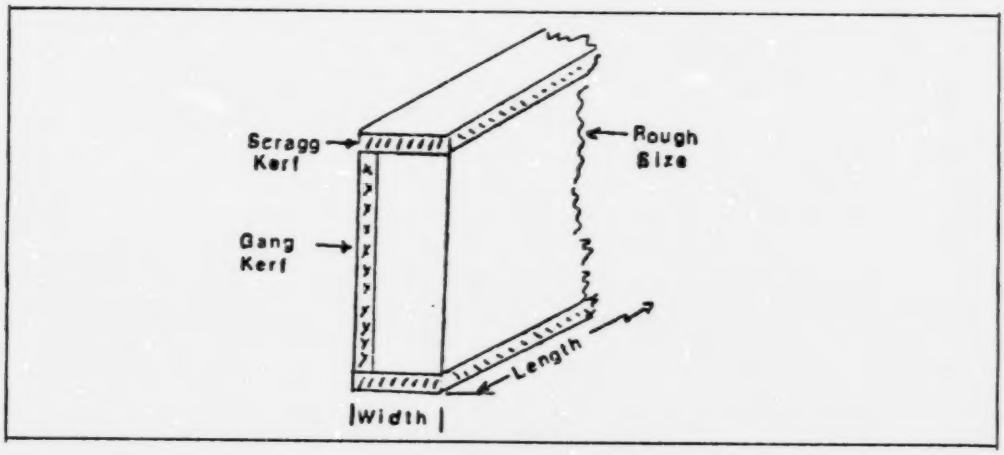

FIGURE 3: Factors considered in calculating the volume of the edge cuts.

The widths being equal to the thickness of the average size as measured by the lumber measurement sheet (or nominal size if actual measurements not available) plus an additional width for the Kerf of the Gang saw.

The thickness being equal to the Scragg saw Kerf.

The length being equal to the total lineal feet of wood converted to metres (multiply feet by .305).

If a chipper head is used rather than a Scragg saw, then the edge cut calculation could be omitted.

Face cuts are calculated for each size using the factors outlined below.

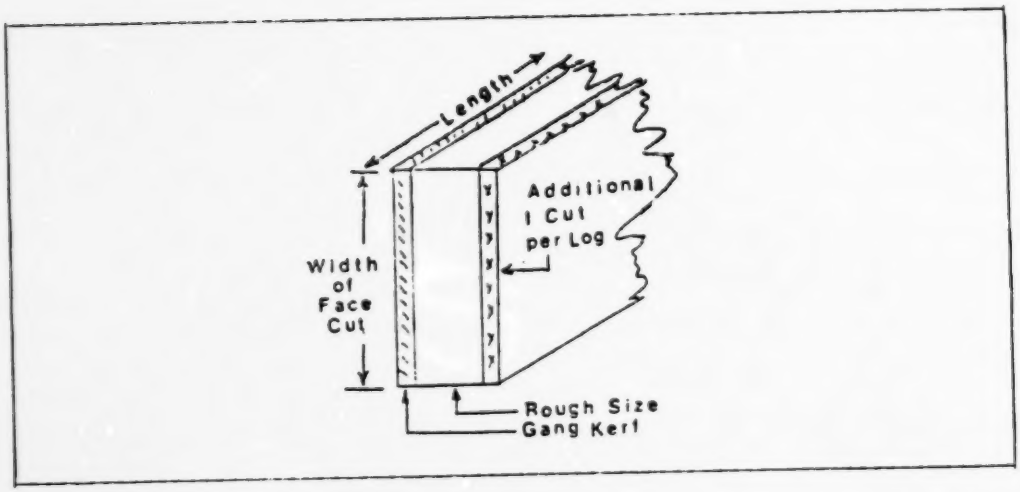

FIGURE 4: Factors considered in calculating the volume of a face cut.

The width is equal to the average width of the boards. To obtain this width, the total volume is divided by the total length (metres) to give the end area of the average piece. The end area is further divided by the average thickness (as calculated for edge) to arrive at the average width. All sizes should be in metres to compile properly (i.e. a thickness of one inch or 2.54 cm should be stated as 0.0254 m).

The thickness is equal to the saw kerf of the Gang saw.

The length is equal to the total length of the boards in metres (feet X 0.305).

An adjustment is made to the total to compensate for the additional cut on each log.

$$\text{Boards/log} = \frac{\text{Total no. boards}}{\text{No. of logs}}$$

$$\text{Cuts/log} = \frac{\text{No. boards}}{\text{Logs} + 1}$$

$$\text{Adjusted face volume} = \frac{\text{Cuts/log}}{\text{Boards/log}} \times \text{Face cut volume}$$

If a resaw is being used, additional face cuts may be calculated for each one inch board using the width, length and kerf of resaw.

The sum of the edge cuts and face cuts will then give the estimate of the total volume of sawdust. This volume in turn divided by the net m^3 volume (X100) to give the percentage.

Example of Sawdust Calculation

Net scale (m^3 1000X)		10 002	
No. of logs		49	
No. of boards	1"	39	
	2"	188	227

Length of Boards	Lin. Feet	Metres @ .305
1"	484	147.62
2"	2 562	781.41

Volume of Rough Lumber (m^3 1000X)	1"	467
	2"	5455

Saw Kerf	Scragg	5/16"	(8 mm)
	Gang	3/16"	(4.8 mm)

Thickness of board (as per lumber measurement sheet or nominal)

1" = 2.54 cm (0.0254 m)

2" = 4.80 cm (0.0480 m)

Thickness of cut (board thickness + kerf of gang)

1" = 0.0254 + 0.0048 = 0.0302

2" = 0.0480 + 0.0048 = 0.0528

Average width of cuts (volume m^3 ÷ length in metres - thickness of board)

1" = .467 - 147.62 - 0.0254 = 0.1245 m (12.45 cm)

2" = 5.455 - 781.41 - 0.0480 = 0.1454 m (14.54 cm)

Volume:

Edge cuts (1000X) 2 edges (thickness of cut X scragg kerf X length in metres)

1" = 2 X 0.0302 X 0.008 X 147.62 X 1000 = 71

2" = 2 X 0.0528 X 0.008 X 781.41 X 1000 = 660

731

Face cut (1000X) 1 face (width of cut X gang kerf X length in metres)

1" = 1 X 0.1245 X 0.0048 X 147.62 X 1000 = 88

2" = 1 X 0.1454 X 0.0048 X 781.41 X 1000 = 545

633

Adjustment of additional face (1 per log)

Boards/log = 227 - 49 = 4.63

Cuts/log = 4.63 + 1 = 5.63

Adjustment = 633 X $\frac{5.63}{4.63}$ = 769

Total sawdust = 731 + 769 = 1500

% Sawdust = $\frac{1500 \text{ X } 100}{10\ 002}$ = 15%

APPENDIX 5

SAFETY

Personal safety should be considered vital when conducting an inspection or a study. Adequate safety equipment should be chosen and the working area considered carefully.

(1) Equipment - The following equipment may be necessary depending upon the situation and length of time spent in the area.

(a) Hard hat - should be considered at all times.

(b) Eye protection - may be required particularly when glasses are not worn and when a person is subjected to flying chips.

(c) Ear protection - may be required when a person is subjected to a prolonged period in a high noise area.

(d) Safety boots - desirable and may be mandatory in some mills and in some locations.

Each individual involved in an inspection or study should obtain the necessary equipment before entering the mill yard. Some mills have equipment on hand and will oblige in providing same if necessary.

(2) Conditions - All persons participating in an inspection or study should make themselves familiar with their surroundings prior to proceeding with the job.

(a) Danger Sign should be noted so those areas may be avoided.

(b) In higher risk areas, the working conditions should be viewed carefully before placing a person in the area.

(c) Attempts to cross moving chains or working equipment should be avoided. It is sometimes best to set up equipment during a work break, unless the mill staff are prepared to stop for a while.

(d) The aid of company personnel (foremen, scalers) in co-ordination is sometimes invaluable, as they know the situations well and are acquainted with the workers. Their participation should be encouraged.

(e) In the yards, working patterns of equipment should be considered, especially fork lifts carrying trees where the span is deceiving.

Smoking is usually restricted around most mills and confined to lunch rooms. As a public image and personal courtesy, these restrictions should be adhered to by any staff involved in a project.

TABLE 1

Actual m^3 Volumes (1000X) of Dry Planed Lumber

Size		m^3 (1000X)	6'	8'	10'	12'	14'	16'	18'	20'
Nominal	Metric(mm)	Per Foot (.305 m)	1.83 m	2.44 m	2.44 m	3.66 m	4.27 m	4.88 m	5.49 m	6.10 m
1 x 3	17 x 64	0.3318	1.991	2.654	3.318	3.982	4.645	5.309	5.972	6.636
1 x 4	17 x 89	0.4614	2.7684	3.691	4.614	5.536	7.649	7.382	8.305	9.228
1 x 6	17 x 140	0.7259	4.355	5.807	7.259	8.710	10.162	11.614	13.066	14.518
1 x 8	17 x 184	0.9540	5.724	7.632	9.540	11.448	33.356	15.264	17.172	19.080
1 x 10	17 x 235	1.2184	7.310	9.747	12.184	14.620	17.057	19.494	21.931	24.368
1 x 12	17 x 286	1.4829	8.897	11.863	14.829	17.794	20.760	23.726	26.692	29.658
2 x 2	38 x 38	0.4404	2.642	3.523	4.404	5.284	6.165	7.046	7.927	8.808
2 x 3	38 x 64	0.7417	4.450	5.933	7.417	8.900	10.383	11.867	13.350	14.834
2 x 4	38 x 89	1.0315	6.189	8.252	10.315	12.378	14.441	16.504	18.567	20.630
2 x 6	38 x 140	1.6226	9.735	12.980	16.226	19.471	22.716	25.961	29.206	32.452
2 x 8	38 x 184	2.1325	12.795	17.060	21.325	25.590	29.855	34.120	38.385	42.650
2 x 10	38 x 235	2.7236	16.341	21.788	27.236	32.683	38.130	43.577	49.024	54.472
2 x 12	38 x 286	3.3147	19.888	26.517	33.147	39.776	46.405	53.035	59.664	66.294
4 x 4	89 x 89	2.4159	14.495	19.327	24.159	28.990	33.822	38.654	43.486	48.318
4 x 6	89 x 140	3.8003	22.801	30.402	38.003	45.603	53.204	60.804	68.405	76.006

TABLE 2

RECOVERY INDEX

SIZE $m^3/m(1000X)$	AVERAGE RECOVERY fbm/m^3	%
20	209	32.89
24	212	33.31
28	214	33.74
30	215	33.95
32	216	34.16
34	218	34.38
36	219	34.59
38	220	34.80
40	221	35.01
42	222	35.23
44	223	35.44
46	225	35.65
48	226	35.86
50	227	36.08
52	228	36.29
54	229	36.50
56	230	36.71
58	232	36.93
60	233	37.14
62	234	37.35
64	235	37.56
66	236	37.78
68	237	37.99
70	239	38.20
72	240	38.41
76	242	38.84
80	244	39.26
84	247	39.69
88	249	40.11
92	251	40.54
96	254	40.97
100	256	41.39

GLOSSARY

Part I: Terms

Actual Lumber Volume - The m^3 volume of a board or group of boards calculated from the actual dry planed lumber size.

Actual Size - The finished size specifically of lumber. The minimum sizes to which lumber may be finished or dressed are specified in the Standard Grading Rules for Canadian Lumber for softwood lumber.

Bucking - Cross-cutting felled trees into logs or bolts.

Caliper - An instrument for determining tree and log diameters by measuring of their rectangular projection on a straight graduated rule via two arms at right angles to (and one of them sliding along) the rule itself.

Cant - A log that has been slabbed on one or more sides by a headsaw for subsequent breakdown into lumber by other machines.

Dressed Salable Lumber - Surfaced on one or more sides by a planer. To be considered salable the lumber must be acceptable as a grade under the Alberta Forest Products Association (A.F.P.A.) grading rules but may not necessarily be graded.

Face Cuts - The cut along the face of a board, usually by a gang saw or resaw. (See Manufacturing Equipment.)

Green Chain - A moving chain or belt on which lumber is transported from saws in a mill. The lumber is pulled from the chain by workers and stacked according to size, length, species and other criteria.

Gross Volume - Total volume including defects.

Kerf - The thickness of wood removed as sawdust by a saw. In this report the kerf is considered to an equivalent to the thickness of the saw.

Gang Kerf - The thickness of wood removed by the gang saw.
Scrag Kerf - The thickness of wood removed by the scrag saw. (See Manufacturing Equipment.)

Lift - A pile of lumber usually of a uniform size stacked in a manner and of a size that can be moved around by a forklift.

Lumber Recovery Factor - The amount of lumber which can be recovered from a net m^3 of log scale. In this manual the amount of lumber may be expressed as foot board measure using the nominal size of a board and in m^3 using the actual size of a board.

Merchantable Length - The total length of the merchantable logs in the sample. This length is obtained on all logs up to the minimum top size specified by the disposition.

Merchantable Volume - See net m^3.

Net m^3 - The volume in m^3 remaining after all deductions for defects from gross volume have been made.

Nominal Size - The size designation for most lumber, plywood and other panel products used for convenience. In lumber, the nominal size is greater than the actual dimensions, thus a kiln dries "2x4" ordinarily is surfaced to $1\frac{1}{2}$ x $3\frac{1}{2}$ inches.

Planed Lumber - Lumber surfaced on one or more sides by a planer.

Rough Lumber - Lumber that has been sawn, edged and trimmed but not dressed (planed).

Skip - Areas on a board that fail to surface clean in the planer. In the Standard Grading Rules for Canadian Lumber skip may be referred to as very light, light, medium or heavy. Hit and miss is a series of skips. Hit or miss means completely surfaced or entirely rough.

Wane - Bark or lack of wood from any cause on any edge or corner of a piece of lumber.

Part II: Manufacturing Equipment

Headrig - The first machine in a sawmill to start the breakdown of logs into lumber products.

Headsaw - The principle saw in a sawmill used to breakdown the logs by cutting parallel to the grain. In many cases this is thought of as a circular saw with a log carriage design but may actually be a scrag or a chip saw.

Scrag Saw - Two or more pair of saws, all sawing different lines used to break the logs into cants. This saw is usually the first machine to start the breakdown of the logs into lumber, thus is commonly referred to as the headrig.

Chip and Saw - A type of machine which chips the exterior of a log resulting in a cant, then saws the cant into boards all in a one-line one-pass process.

Chipper Canter - A headrig machine that reduces the barked logs directly to chips and cants without producing sawdust.

Gang Saw - A cluster of parallel saws used to breakdown cants into lumber. These may be referred to by type being, sash gang, circular gang, bull edger, twin bandsaw or quad bandsaw.

Bandsaw - A band of steel with teeth on one edge (single cutting) or both edges (double cutting) running on a set of large wheels. They may be referred to as twin-band or quad-band. A twin-band is an adjustable, double bandsaw headrig making two cuts simultaneously. A quad-band makes four cuts simultaneously.

Sash Gang Saw - A sash or a frame holding a battery of parallel saws that move up and down. This saw usually saws cants into several boards in one pass.

Edger - A machine used to produce two paralled sides (wide face) by removing the rounded edges of a board (wane).

Chipper Edger - A machine which chips one face of the board and saws or chips to parallel sides to remove the wane.

Resaw - A machine used for recovering lumber from slabs, for breaking down cants into lumber and for upgrading lumber by ripping off defective portions.

Chipper - A machine for cutting wood into woodchips of more or less uniform dimensions and includes chipper canters, chip and saws and chipper edgers.

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